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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,869	09/29/2003	Darbha Srinivas	4062-91	5403
23117 7590 04/04/2007 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203			EXAMINER CHU, YONG LIANG	
			ART UNIT	PAPER NUMBER
			1626	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		04/04/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/671,869

Applicant(s)

SRINIVAS ET AL.

Examiner

Yong Chu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 January 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 4 and 5 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 6-16 is/are rejected.
- 7) ☒ Claim(s) 1-3, and 6-16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a). Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claims 1-16 are currently pending in the instant application.

Response to Restriction Requirements

The response to the restriction request with election of Group III (claims 1-3 (in part), 6, and 7-16 (in part), wherein the zeolite-based catalyst is a solid organometallic complex) *without traverse* by Applicants' representative, Mr. Larry S. Nixon dated on 26 January 2007, has been considered.

Status of the Claims

Claims 4-5, and remaining subject matter of claims 1-3, and 7-16 are further withdrawn from further consideration by the Examiner as being drawn to non-elected inventions due to restriction requirement. The withdrawn subject matter is patentably distinct from the elected subject matter as it differs in structure and element and would require separate search considerations. In addition, a reference that anticipates one invention would not render obvious the other invention. Therefore, claims 1-3, and 6-16 will be examined on the merits.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-3, 6, and 7-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement.

The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

As stated in the MPEP 2164.01(a), "There are many factors to be considered when determining whether there is sufficient evidence to support a determination that a disclosure does not satisfy the enablement requirement and whether any necessary experimentation is "undue".

In In re Wands, 8 USPQ2d 1400 (1988), factors to be considered in determining whether a disclosure meets the enablement requirement of 35 U.S.C. § 112, first paragraph, have been described. They are:

1. the nature of the invention,
2. the state of the prior art,
3. the predictability or lack thereof in the art,
4. the amount of direction or guidance present,
5. the presence or absence of working examples,
6. the breadth of the claims,
7. the quantity of experimentation needed, and
8. the level of the skill in the art.

The Nature of the Invention

In the instant case, claims 1-3, 6, and 7-16 claim a process for the preparation of cyclic carbonates which comprising reacting an olefin or an epoxide thereof with carbon dioxide, in the presence of zeolite-based catalyst and a Lewis base co-catalyst.

The State of the Prior Art

The state of the prior art is that the process for the preparation of cyclic carbonates depends on various conditions. The use of catalyst is critical to the process. The cyclic carbonates include very different compounds with various ring sizes. It is well-known to one skilled in the art that the chemical properties and stability of such compounds vary with the size of the chemical compounds. The chemical reaction conditions for such synthesis are decided by the starting material and the final products.

The predictability or lack thereof in the art

The predictability or lack thereof in the art is low. The methods for making such different compounds starting with olefin is very different from the methods starting from epoxides, they are not obvious in terms of the predictability in terms of synthetic routes and associated conditions. It is well-known to one skilled in the art that the reactivities of olefin are very different from ones of epoxide because the basic chemical structures are different, and the properties and stability of cyclic carbonate vary with the size of the ring. The method for making such cyclic carbonates as claimed is unpredictable and requires undue experimentation. However, the specification only discloses a limited number of examples (e.g. Examples 7-14) for making the ethylene-cyclic carbonate by reacting epichlorohydrin and carbon dioxide under various catalysts.

The amount of direction or guidance present and the presence or absence of working examples

While the specification has provided process while being enabling for making ethylene-cyclic carbonate by reacting epichlorohydrin and carbon dioxide in the

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presence of said catalyst, does not reasonably provide enablement for making other cyclic carbonate by reacting an epoxide or olefin with carbon dioxide under said condition.

The breadth of the claims

The claims are broad, which claim a process for the preparation of cyclic carbonates which comprises reacting an olefin or an epoxide thereof with carbon dioxide or a mixture of oxygen-containing compound and carbon dioxide, in the presence of zeolite-based catalyst and a Lewis base co-catalyst, separating the catalyst and recovering the corresponding cyclic carbonate formed.

The quantity of experimentation needed

The quantity of experimentation needed is undue. One of ordinary skill in the art, without direction, would be unable to make other cyclic carbonate by reacting an epoxide with carbon dioxide under said condition for just olefin. It is also require undue experimentation.

To overcome the rejection, Applicants need to cancel the subject matters using epoxide as the starting materials, and specifically define the size of the cyclic carbonates in light of the Specification.

Claim 9 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for making ethylene-cyclic carbonate in a halogenated quite non-polar aprotic solvent of 1,2-dichloromethane does not reasonably provide enablement for making said cyclic carbonates in the other strong polar protic solvents such as methanol or water as being claimed. It is well-known to one skill in the

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art that a non-polar aprotic solvent works differently from polar protic solvents, unless having experimental data to support otherwise.

Claim 10 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for making ethylene-cyclic carbonate in the presence of DMAP (N,N'-dimethylamino pyridine) does not reasonably provide enablement for making said cyclic carbonates in the other Lewis base co-catalysts such as alkyl phosphine, aryl phosphine, phosphonium or alkyl ammonium salts as being claimed. It is well-known to one skill in the art that DMAP is a pyridine based catalyst, which works differently from phosphine based reagents, ammonium salts, or phosphonium salts, unless having experimental data to support otherwise.

Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The term "cyclic carbonates" could be many different cyclic carbonates with different sizes and/or substituents. Applicants need to include a specific chemical formula to define "cyclic carbonates".

The term "olefin" is a chemical compound contains double bond. However, there could be many different olefins by the length of carbon chain, and substitution. Applicants need to include a specific chemical formula to define "olefin".

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The term "oxygen-containing compound" could be almost everything includes H₂O. Applicants need to specifically define the term, which is especially important for a process claim.

The term "zeolite-based catalyst" could be interpreted as a catalyst containing zeolite as a support with additional unspecified active components. Applicants need to specifically define the term, which is especially important for a process claim.

The term "Lewis base co-catalyst" is broadly defined as any substance having a lone pair of electrons. Applicants need to specifically define the term, which is especially important for a process claim.

Claim 10 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The term "Lewis base co-catalyst" is broadly defined as any substance having a lone pair of electrons. Applicants need to specifically define the term, which is especially important for a process claim.

The term "a pyridine derivative" is indefinite, because there is no chemical formula provided to define the "pyridine derivative". Applicants need either to import the definition of pyridine derivative from the specification or delete it.

Claim 10 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which

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was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The phrase "a solid organometallic complex comprising of N and O- donor atoms" is not clearly described for the term "N and O-donor atoms", as well as "a solid organometallic complex". To overcome this rejection, Applicants need to clearly define what type of organometallic complex.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "zeolite-like" is indefinite, because it is not clear how to define the term "zeolite -like", thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d).

Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "containing N- and/or O-donor" is indefinite, because it is not clear how to define the meter and bounty, thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d).

Regarding claim 6, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

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Claim 16 recites the limitation "the conversion of the hydrocarbon.." in claim 1.

There is insufficient antecedent basis for this limitation in the claim

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-3, and 6-16 are rejected under 35 U.S.C. 103 (a) as unpatentable over Kim et al., *U.S. Patent No. 6,407,264 in view of Sabater et al. Chem. Commun.*, **1997**, pp.1285-86.

Applicants' instant elected invention in claims 1-3, and 6-16 claim a process for preparation of cyclic carbonates, comprising reacting an epoxide with carbon dioxide in the presence of zeolite-based catalyst and a Lewis base co-catalyst

Determination of the scope and content of the prior art (MPEP §2141.01)

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Kim et al. disclose a process for producing cyclic ethylene carbonate, comprising reacting ethylene epoxide with carbon dioxide in the presence of a catalyst system comprising a) metal halide [MX_m] and b) pyridine or pyridine derivatives (e.g. 2-methyl pyridine, 2-ethyl pyridine,...).

Ascertainment of the difference between the prior art and the claims (MPEP §2141.02)

The difference between Kim prior art and the instantly claimed process is that the prior art lacks disclosure of this cluster catalyst compound being encapsulated in a porous cage.

However, Sabater teaches that encapsulating similar transition metal compounds inside the cage of zeolite Y is conventional in the art (abstract; scheme 1).

Finding of prima facie obviousness--rational and motivation (MPEP §2142-2413)

It would have been obvious to one of ordinary skill in the art to apply the teaching of Sabater to the disclosure of Kim with a reasonable expectation of making the cyclic carbonate.

The selection of reaction conditions is more optimization by more modification of routine experimentation and within one skilled in the art. Changes in temperature, concentration, or both are not patentable modification in the absence of unexpected results, which are different in kind, and not degree. In re Aller, 105 USPQ 233.

Discovery of an optimum value of a result effective variable is not patentable if such discovery is within one skilled in the art. A prima facie case of obviousness may be rebutted in optimizing a variable only when results are unexpectedly good. In re. Boesch, 205 USPQ 215.

Claim Objections

Claims 1-3, and 6-16 are objected to for containing elected and non-elected subject matter. The elected subject matter has been identified supra. Applicant should amend the claims according to the scope of the invention.

Conclusion

No claims are allowed.

Telephone Inquiry

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yong Chu whose telephone number is 571-272-5759. The examiner can normally be reached between 7:00 am - 3:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph K. McKane can be reached on 571-272-0699. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Yong Chu, Ph.D.

Patent Examiner

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